INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

MASTER OF BUSINESS ADMINISTRATION

COURSE DESCRIPTOR

Course Title	**QUANTATITIVE ANALYSIS FOR BUSINESS DECISIONS**			
Course Code	**CMBB29**			
Programme	MBA			
Semester	III			
Course Type	Core			
Regulation	IARE - R18			
Course Structure	**Lectures**	**Tutorials**	**Practical Work**	**Credits**
	4	-	-	4
Chief Coordinator	S Shireesha, Assistant Professor, MBA			
Course Faculty	S Shireesha, Assistant Professor, MBA			

I. COURSE OVERVIEW:

The primary objective of this course is to introduce the concept of operation research as a precise mathematical concept, and study how to assign jobs to workers, enhance the profit to companies by applying different methods of operation research. The course consists of Scheduling, Queuing and Decision trees to optimize the solutions.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites
PG	CMBB05	I	Statistics for Management

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Quantitative Analysis for Business Decisions	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✔	Chalk & Talk	✘	Quiz	✔	Assignments	✔	MOOCs
✔	LCD / PPT	✔	Seminars	✘	Mini Project	✔	Videos
✘	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two CIA examinations or the marks scored in the make-up examination.

Semester End Examination (SEE): The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into five units and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows. Two full questions with "either" or "choice" will be drawn from each unit. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept.
50 %	To test the analytical skill of the concept OR to test the application skill of the concept.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 25 marks for Continuous Internal Examination (CIE), 05 marks for Alternative Assessment Tool (AAT).

Table 1: Assessment pattern for CIA

Component	**Theory**		**Total Marks**
Type of Assessment	CIE Exam	AAT	
CIA Marks	25	05	30

Continuous Internal Examination (CIE):

Two CIE exams shall be conducted at the end of the 8th and 16th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part–A shall have five compulsory questions of one mark each. In part–B, four out of five questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams.

Alternative Assessment Tool (AAT):

Marks shall be awarded considering the average of two AAT for every course. The AAT may include seminars, assignments, term paper, open ended experiments, five minutes video and MOOCs.

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		**Strength**	**Proficiency assessed by**
PO1	**Managerial Skills**: Apply knowledge of management theories and practices to solve business problems.	2	Assignments
PO2	**Decision making Skills:** Foster analytical and critical thinking abilities for data-based decision making.	3	Assignments
PO7	**Strategic analysis**: Ability to conduct strategic analysis using theoretical and practical applications.	2	Seminars

Program Outcomes (POs)		Strength	Proficiency assessed by
PO8	**Technology Skills:** Inculcate and develop technical skills to face the competitive world successfully.	2	Seminars

3 = High; 2 = Medium; 1 = Low

VII. COURSE OBJECTIVES :

The course should enable the students to:	
I.	Apply the quantitative methods for business decision making.
II.	Maintain fundamental applications in industry and public sector to face uncertainties and scarcity of resources.
III.	Facilitate mathematical and computational modelling of real decision making problems including the use of modelling tools.
IV.	Familiarize with the design implementation and analysis of computational experiments.

VIII. COURSE OUTCOMES (COs):

CO Code	CO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
CMBB29.01	CO1	Apply quantitative techniques to translate a real-world problem for business decisions using Mathematical tools.	PO1	2
CMBB29.02	CO2	Understand the topic of linear programming problem and its use in practical problems for optimization.	PO1, PO2	3
CMBB29.03	CO3	Develop fundamental applications of those tools in industry and public sector in contexts involving uncertainty and scarce or expensive resources.	PO2, PO7	3
CMBB29.04	CO4	Illustrating with the design implementation and analysis of computational experiments.	PO1, PO7	3
CMBB29.05	CO5	Understand the concept of operation research to optimize the solution.	PO1, PO2	3
CMBB29.06	CO6	Ability to work in a team: specifically to solve larger problems, communicate technical knowledge, partition a problem into smaller tasks, and complete tasks on time.	PO1, PO2	3
CMBB29.07	CO7	Facilitate to identifying, accessing, evaluating, and interpreting information and data in support of assignments, projects, or research.	PO2	3
CMBB29.08	CO8	Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.	PO2, PO8	3
CMBB29.09	CO9	Develop and understand mathematical models for problems that arise in various disciplines.	PO1	2

3 = High; 2 = Medium; 1 = Low

IX. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

COs	Program Outcomes (POs)			
	PO1	PO2	PO7	PO8
CO 1	2			
CO 2	3	3		
CO 3		3	3	
CO 4	3		3	
CO 5	3	3		
CO 6	3	3		
CO 7		3		
CO 8		3		3
CO 9	2			
CO 10			3	3

3 = High; 2 = Medium; 1 = Low

X. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO1, PO4, PO7, PO8.	SEE Exams	PO1, PO4, PO7, PO8.	Assignments	PO1,PO4	Seminars	PO7, PO8.
Laboratory Practices	-	Guest Lecture	-	Mini Project	-	Certification	-
Term Paper							

XI. ASSESSMENT METHODOLOGIES - INDIRECT

√	Assessment of course Outcomes (by feedback, once)	√	Student feedback on faculty (twice)
X	Assessment of mini projects by experts		

XII. SYLLABUS

UNIT-I	NATURE AND SCOPE OF OPERATION RESEARCH
Origins of operation research, applications of operation research in different managerial areas, defining a model, types of model, process for developing an operations research model, practices, opportunities and short comings of using an operation research model.	
UNIT-II	**ASSIGNMENT MODEL**
Algorithm for solving assignment model, Hungarian's method for solving assignment problem, variations of assignment problem: multiple optimal solutions, Maximization case in assignment problem. Unbalanced assignment problem, travelling salesman problem, simplex method for solving assignment problem.	

UNIT-III	LINEAR PROGRAMMING METHOD
Transportation problem: mathematical model of transportation problem, methods for finding initial feasible solution: northwest corner Method, least cost method, Vogel's approximation method, test of optimality by Modi Method, variation transportation, Problems like unbalanced supply and demand, degeneracy and its resolution. Structure of LPP, assumptions of LPP, Application areas of LPP, guidelines for formulation of LPP, formulation of LPP For different areas, solving of LPP by graphical method: simplex method, two phase method, big-M method, converting primal LPP to dual LPP, limitations of LPP.	
UNIT-IV	**DECISION THEORY**
Introduction, ingredients of decision problems, decision making under uncertainty, cost of uncertainty, under risk, under perfect information, decision tree, construction of decision tree.	
UNIT-V	**QUEUING THEORY**
Queuing structure and basic components of a queuing model, distributions in queuing model, Differences in queuing model with FCFS, queue discipline, single and multiple service station with finite and infinite population.	
Text books	
1. J.K. Sharma, "Operations Research", Theory and applications, MacMillan, 5th Edition, 2013. 2. R. Pannerselvam, "Operations Research", PHI, 3rd Revised Edition, 2012.	
Reference books	
1. Anand Sharma, "Quantitative Techniques for Decision Making", HPH, 1st Edition, 2010. 2. Prem Kumar Gupta "Introduction to Operations Research" S.Chand, 5th Edition, 2012. 3. K.L Schgel "Quantitative Techniques and Statistics", 3rd Revised Edition, 2012. 4. Hillier / Lieberman, "Introduction to operations research", 9th Edition, TMH, 2012. 5. Hamdy A Taha, "Operations Research: An Introduction", Pearson, 9th Edition, 2013.	
Web References	
1. http://web.itu.edu.tr/topcuil/ya/OR.pdf 2. http://textofvideo.nptel.iitm.ac.in/112106134/lec1.pdf	
E-Text Books	
1. https://www.goodreads.com/shelf/show/operations-research 2. https://books.google.co.in/books/about/Operations_Research	

XIII. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Lecture No	Topics to be covered	Course Outcomes (COs)	Reference
1	Origins of operation research	CO1	T-1 p.g. 1-5, R-2 p.g 2-10
2-3	Applications of operation research in different managerial areas	CO1	T-2 p.g. 6-18, R-2 p.g. 25-26
4	Defining a model and types of model	CO1	T-1 p.g.19 - 23, R-2 p.g. 27-32
5-7	Process for developing an operations research model, practices	CO2	T-1 p.g. 19-25, R-2 p.g. 33-35

Lecture No	Topics to be covered	Course Outcomes (COs)	Reference
8	Opportunities and short comings of using an operation research model.	CO2	T-2 p.g. 98-104, R-2 p.g. 48-58
9-10	Algorithm for solving assignment model, Hungarian's method for solving assignment problem	CO2	T-1 p.g. 78-99, R-1 p.g. 85-95
11	Basic assignment problem	CO2	T-2 p.g. 104-115, R-2 p.g. 99-105
12	Multiple optimal solutions	CO3	T-1 p.g. 116-119, R-2 p.g. 154-158
13	Maximization case in assignment problem	CO3	T-2 p.g. 117-126, R-2 p.g. 155-198
14	Unbalanced assignment problem	CO3	T-1 p.g. 158-159, R-2 p.g. 116-125
15-16	Travelling salesman problem	CO4	T-1 p.g. 99-135, R-2 p.g. 105-145
17-18	Simplex method for solving assignment problem	CO4	T-2 p.g. 138-165, R-2 p.g. 142-153
19	Transportation problem: mathematical model of transportation problem	CO4	T-1 p.g. 168-175, R-2 p.g. 65-68
20	Methods for finding initial feasible solution: northwest corner Method, least cost method	CO4	T-2 p.g. 77-85, R-2 p.g. 112-116
21	Vogel's approximation method	CO5	T-1 p.g. 177-186, R-1 p.g. 117-125
22-23	Test of optimality by Modi Method, Degeneracy and its resolution	CO5	T-2 p.g. 98-105, R-2 p.g. 214-225
24	Variation transportation, Problems like unbalanced supply and demand	CO5	T-1 p.g. 210-230, R-2 p.g. 198-215
25	Structure of LPP, assumptions of LPP, Application areas of LPP, guidelines for formulation of LPP, formulation of LPP For different areas	CO6	T-2 p.g. 226-234, R-1 p.g. 214-225
26	Solving of LPP by graphical method	CO6	T-2 p.g. 214-235, R-2 p.g. 190-215,
27	simplex method	CO6	T-1 p.g. 210-255, R-1 p.g. 98-116
28	Two phase method and Big-M method	CO6	T-2 p.g. 260-265, R-2 p.g. 216-235
29	Converting primal LPP to dual LPP, limitations of LPP	CO6	T-1 p.g. 266-278, R-2 p.g. 236-245
30-31	Introduction, ingredients of decision problems	CO7	T-1 p.g. 260-277, R-1 p.g. 235-245
32	Decision making under uncertainty	CO7	T-1 p.g. 289-297, R-1 p.g. 240-256
33-35	Cost of uncertainty, under risk, under perfect information,	CO8	T-2 p.g. 315-325, R-1 p.g. 235-256
36-38	Decision tree, construction of decision tree.	CO8	T-1 p.g. 316-335, R-1 p.g. 302-325

Lecture No	Topics to be covered	Course Outcomes (COs)	Reference
39	Queuing structure and basic components of a queuing model,	CO9	T-1 p.g. 304-308, R-2 p.g. 215-223
40-41	distributions in queuing model, Differences in queuing model with FCFS, queue discipline,	CO9	T-1 p.g. 309-325, R-1 p.g. 216-225
42-43	single and multiple service station with finite population.	CO9	T-1 p.g. 339-350, R-1 p.g. 230-255
44-46	single and multiple service station with infinite population.	CO9	T-1 p.g. 367-375, R-1 p.g. 237-248

XIII. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S NO	Description	Proposed actions	Relevance with POs
1	Problem reductions, time and intractability	Seminars / Guest Lectures.	PO1, PO2, PO7
2	Encourage students to work on real time problems based on the taught concepts to optimize problems.	Seminars / Guest Lectures.	PO2, PO7, PO8

Prepared by:
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